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ABSTRACT

Part 1 of this two-part document reviews efforts to develop computer-based case management simulations for use in rehabilitation education. It examines both single-case management simulations which concentrate on clinical problem-solving skills required to serve a single client and multiple-case management simulations which focus on skills required to serve entire caseloads. Exemplary systems are described. Issues related to research and development of computer software in case management are discussed, including procedures for quantifying case simulation performance; psychometric issues such as reliability, validity, and norms; and future research. Part 2 is a master's thesis by Andrew Jay Rosen on the development and validation of a computerized caseload management system which simulates the responsibilities of a state vocational rehabilitation counselor. It is noted that the simulation presents eight cases for trainees to manage through the statuses of the state vocational rehabilitation system, and that when the completed simulation was presented to state vocational rehabilitation counselors and to graduate and undergraduate rehabilitation students, the counselors performed with superior caseload management skills in several important areas. This difference between the performance of counselors and trainees is presented as evidence that the computer simulation represents an educational tool which could be used to address the lack of training in caseload management skills presently occurring in the education of the rehabilitation counselor. (66 references) (NB)

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Evaluating Rehabilitation Caseload Management Skills Through Computer Simulations

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1. Review of Literature

Abstract

Efforts to develop computer-based case management simulations for use in rehabilitation education are reviewed, exemplary systems are described, and issues related to research and development of computer software in case management are discussed.

Computer-based Case Management Simulations in Rehabilitation Education

Computer-aided instruction (CAI) is an effective teaching technique that has been available for nearly two decades (Braun, 1980; Frenzel, 1980; Gerhold, 1978; Office of Technology Assessment, 1979). Among the primary advantages of CAI over traditional classroom teaching methods are the individualized instruction, automatic interaction, and immediate feedback that the computer can provide (Frenzel, 1980). In addition, CAI can be an exciting and interesting method for introducing students to the use of computers promoting the development of computer literacy. Unfortunately, because of the historically high cost of electronic computing on large mainframe computers and medium-sized minicomputers, CAI has not been extensively used. However, with the advent of large-scale integrated (LSI) circuits and personal microcomputers, the cost of CAI is no longer prohibitive. As a result, there is currently a resurgent interest in the application of computers in professional education (Berven, 1985a; Chubon, 1986; Frenzel, 1980).

In rehabilitation, the provision of high-quality services to large numbers of clients with a wide variety of disabling conditions and rehabilitation

needs is a great challenge to practitioners (Cox, Connolly & Flynn, 1981). To meet this challenge, rehabilitation counselors must develop not only counseling skills, but also case management (coordinating) skills, such as clinical problem-solving, time usage, budgeting, communication, use of community resources, and documentation. Considerable time is devoted to counseling skills in the preparation of rehabilitation counselors, but only recently has consideration been given to systematic preparation in case management (Cox et al., 1981). One reason for this lack of attention may be the need for hands-on experience in developing case management skills, along with the difficulties in simulating this experience in a formal classroom setting.

To facilitate training in case management, rehabilitation educators have begun to develop computer simulations capable of teaching and evaluating case management skills (c.f., Berven, 1985b; Berven & Scofield, 1980; Chan, 1988; Chan, Parker, Lam, Mecaskey & Malphurs, 1987; Chan & Questad, 1981; Chubon, 1986). Computer simulations appear to be a potentially fruitful area of research and development in rehabilitation education. The purpose of this paper is to review the current state-of-the-art in the

development of computer-based case management simulations in rehabilitation education. Exemplary systems are described, and issues related to the research and development of computer simulation software in rehabilitation education are discussed.

Computer-based Case Management Systems

Standardized simulations of clinical practice situations, or analogues, have been applied extensively in research on generic counseling (Munley, 1974). These applications of standardized simulations have focused on basic interviewing skills, such as communication of empathy (e.g., Hodge, Payne & Wheeler, 1978) and confrontation (e.g., Rosenthal, 1977).

In rehabilitation counseling, case management skills are also important and, as a result, simulations have been developed which focus on case management skills. Clients of rehabilitation agencies often have diverse and complex needs and outside resources must often be used to supplement the assessment and intervention provided directly by the rehabilitation counselor (Berven, 1985b). Sophistication in case management skills is necessary to identify needed resources and to coordinate the provision of services that will meet the medical, psychological, social, educational, and vocational needs of people with

disabilities (Berven, 1985b). As a result, simulations have been developed in rehabilitation that focus on the training and evaluation of case management skills.

There are many advantages in using computer-based case simulations as instructional tools in rehabilitation education. Computer simulations can expose students to simulated clients representing a range of disabilities, complexities of problems presented, and service needs, within a relatively short period of time; inappropriate case management actions taken by the student can be corrected without detrimental effects to actual clients; and students can develop improved problem-solving skills by modeling their approaches and strategies on the approaches of successful counselors (Chan et al., 1987).

A review of the literature reveals that computer-based case management simulations can be classified as either single-case management simulations or multiple-case (caseload) management simulations. The single-case simulations concentrate on clinical problem-solving skills required to serve a single client appropriately (e.g., gathering medical, psychosocial, vocational-educational information to determine eligibility). Multiple-case simulations focus on skills required to serve entire caseloads (i.e.,

managing caseloads of varying sizes and types, with varying constraints in time, resources, funds, and staff while following appropriate agency procedures (Berven, 1987; Chan, 1988; Chan et al., 1987). These two types of simulations will be discussed in the following sections.

Single-Case Management Simulation

Berven and his associates (Berven, 1985b; Berven & Scofield, 1980; Chan et al., 1987) exemplify research efforts in developing single-case management simulations. Berven and Scofield (1980) first reported the development of a computer-based simulation of this type. Later, Berven (1985b) reported the development of another set of three computer-based simulations and examined their psychometric properties; with encouraging results. All of these simulations were developed on a mainframe UNIVAC computer. Chan et al. (1987) adapted the Berven & Scofield simulation to run on IBM PC or compatible microcomputers. Similarly, Haller-Hinz (1987) adapted the program for use on Apple II series microcomputers. These microcomputer adaptations of Berven and Scofield's program make the simulation usable in any location with access to either of these widely available microcomputers and also reduce the cost of use substantially.

The case used in the Berven and Scofield (1980) simulation involved a 20-year old self-referred male client with a seizure disorder due to a head injury. In completing the computer simulation, participants assume the role of a rehabilitation counselor in a state vocational rehabilitation agency who must determine the actions to be taken in serving the client up to the point of eligibility determination. The simulation provides 21 possible actions, including 10 medical and specialist examinations, psychological evaluation; work verification, social services evaluation, educational history, a 14-day vocational evaluation, and up to 6 interviews conducted with the client. As actions are selected, reports are provided describing the findings of the examination or evaluation; as interviews are requested the casenotes are presented in a predetermined order summarizing information obtained directly from the client and events observed as a result of these client contacts.

Reports from the various actions can be requested one at a time. A list of possible actions is printed at the terminal (or presented on the monitor) and the trainee enters the number of the action desired using the terminal or microcomputer keyboard. After reading information from an action taken, another action can be

requested from those remaining. This sequence is repeated until a participant feels that sufficient information has been obtained to determine eligibility for services. At this point, participants are asked to make several determinations: the client's primary disability, if any; the secondary disability; whether the disability (or disabilities) result in a handicap to employment; whether the client is eligible for state vocational rehabilitation agency services; whether services will likely render the client employable; and the probability that rehabilitation services will result in employment. After participants finish entering their responses, the computer evaluates their performance and provides appropriate feedback in terms of two scores; a proficiency index (PI) and an efficiency index (EI). The simulation generally requires about 30 minutes to complete.

Berven and Scofield (1980) reported that the computer simulation was helpful in describing the performance of a group of graduate students in rehabilitation counseling relative to a criterion group of experienced counselors. Based on the proficiency (PI) and efficiency (EI) indexes, Berven and Scofield empirically clustered students into performance groups: a constricted approach, a shotgun approach, and two

different thorough and discriminating approaches. In a separate study, Chan et al. (1987) demonstrated the use of a microcomputer version of that simulation to describe the performance of a sample of undergraduate students in rehabilitation.

Noting the limitations of simulating just one case, Berven (1985b) later developed another set of three case simulations to study the psychometric properties (validity and reliability) of computer-based case simulations. The simulations were more sophisticated than the earlier versions, providing 78 alternative actions and proceeding through the entire rehabilitation process from intake through completion of service. In addition, multiple actions could be taken simultaneously, time was monitored in terms of case service weeks, and reports of some actions, such as counseling and training interventions, were provided as a series of progress reports. Results were encouraging in suggesting that case simulations can provide a viable assessment method. However, to maximize the assessment of skills and the learning experience provided, a library of single-case management software would be required, representing a range of cases in terms of such factors as disability

type, case complexity, and variety of case service actions needed to adequately serve the client.

In addition to Berven's work, several other computer simulations have been reported in the rehabilitation literature that can also be classified as single-case management simulations. Chan and Questad (1981) developed a microcomputer-based case review system for use by vocational evaluation trainees in data-based decision making. The computer program allows novice vocational evaluators to systematically analyze and review past cases similar to a particular evaluation situation. The purpose is to alert novice evaluators to potential problem areas in the evaluation process, to provide information on appropriate evaluation approaches to use with a particular case, and to teach decision-making strategies employed by experienced staff in the vocational evaluation process.

Similarly, Chubon (1986) described GENESIS II, a computer-based case management simulation program for Apple II series computers, allowing participants to learn appropriate clinical decision-making strategies by requesting intake interview, consultation, referral, and vocational assessment information. Evaluative statements are used to provide feedback for actions taken by participants.

O'Toole (1988) developed a series of generic counseling simulations involving the preparation for and conduct of an initial counseling session for use on Apple II Series Computers. The simulated client is assumed to have been previously seen by an intake worker, including some formal testing, and has presumably been assigned to the participant completing the simulation for ongoing counseling. The trainee must first select case file information developed by the intake worker, including general information (e.g., demographic, mental status, medical history, presenting problems, and impressions), history (e.g., childhood, family, social, health, and employment), and test data. Each report is assigned an estimated time required for review varying from four to eight minutes, and a maximum of 45 minutes is allowed for review of information selected.

Areas to be explored in the interview are then selected from menus, including general rapport and perceptions of problems, current behavior and concerns, coping skills, and previous solutions attempts. As each interview topic is selected, a transcript of the interview segment is presented. Each segment is estimated to require 1 1/2 minutes, and a total interview time of 30 to 45 minutes must be completed.

After the interview, the trainee then participates in a simulated meeting with a supervisor. The trainee is queried regarding conceptualizations of the client and feedback is provided regarding the accuracy of those conceptualizations. The simulations are a part of a training package, also including tutorials and drill and practice exercises, written for Apple II series microcomputers.

Janikowski and Berven (1987) have developed a computer-based simulation, which is somewhat different though related to single-case management simulations. The exercise is based on the case service history of an actual client and focuses specifically on skills in predicting client behavior. A series of 25 episodes in the client's case history is presented with the aid of an IBM PC microcomputer. For each episode four alternative outcomes are presented and a student completing the exercise is asked to predict which outcome actually occurred. The student continues choosing until the correct outcome is selected, and then the next episode is presented. Students who achieve the highest scores are those requiring the fewest choices in identifying the correct outcome in each of the 25 episodes. Scores are presumed to reflect ability to process information about past

client behavior and use it in making accurate predictions about future behavior.

Multiple-Case (Caseload) Management Simulations

Computer-based single-case management simulation programs focus on the clinical decision-making process using a single case. However, practicing rehabilitation counselors must manage a number of cases simultaneously, with caseloads of varying sizes and types, and varying demands on time, resources, funds and staff support. Since caseload management is an important skill within the broader domain of case management, the development of computer-based multiple-case management simulations can complement the single-case approach both focusing on the total concept of rehabilitation case management (both clinical problem-solving and caseload management skills).

Up to the present time, there has been little attention given to multiple-case management simulations. However, Chan (1988) has developed a multiple-case system with the support of the American Association for Counseling and Development (AACD) professional enhancement grant. The computer program simulates cases managed by a general caseload counselor over a six-month period, with about 20 clients, a fixed budget of $20,000, a total of 1040 possible working

hours, and a bank of 250 possible case management activities. For each case management activity selected by a participant, the computer provides a brief description of the outcome of the action and estimates the appropriate amounts of time and costs required from the total budget and time allotted for the participant, and subtracts these amounts from the totals available. In addition, distractor events such as staff meetings, sick leave, and in-service training time are incorporated to simulate typical time demands and distractions in the everyday management of rehabilitation caseloads.

The trainee learns about caseload management activities, agency procedures in caseload management, and caseload management strategies. The trainee's performance on the computer simulation is evaluated according to several measures of effectiveness such as the referral rate, referral backlog, status distribution, disability distribution, age distribution, cost distribution by status, time distribution by status, decision-making rate, acceptance rate, and rate of successful rehabilitation closures (Chan, 1988). Student and counselor norms will be developed using appropriate comparison groups and performance criteria and feedback will be provided.

it appears that computer-based caseload management simulations can complement single-case simulations in teaching and evaluating total case coordination skills.

Procedures for Quantifying Case Simulation Performance

Quantification of performance on case management simulations is typically required for instructional applications in rehabilitation education. If simulations are used as a part of formal evaluation procedures in courses, modules, or comprehensive examinations, quantification procedures are required in assigning scores or grades which accurately reflect performance. If simulations are used as learning exercises, quantification or related procedures to describe performance are an important part of feedback to students, helping them to improve future performance. In both instances, quantification procedures can point out strengths and needed areas of improvement for future instructional intervention.

Berven and Scofield (1980) developed quantification procedures based on methods previously established for patient management problems in medicine (McGuire & Babbott, 1967; Williamson, 1965). For each action available to be taken in a case management simulation, a usefulness index is derived based on the

percentage of individuals in a criterion group of experienced practicing counselors who take the action in completing the simulation. For the Berven and Scofield simulation, 21 actions were available and the usefulness indexes varied from a high of 91.7 for each of two actions, a general medical examination and a first interview with the client (indicating that 91.7% of the criterion group took each of those actions) to 0.0 for seven of the available actions (indicating that no one in the criterion group took those actions). Scores reflecting the usefulness of each individual action taken by a student could be helpful in examining tendencies to take or neglect particular actions.

In addition, Berven and Scofield (1980) developed two composite indexes reflecting overall performance on their simulation, a proficiency index (PI) and an efficiency index (EI). The PI score was designed to indicate the extent to which all important actions were taken and is derived by summing the usefulness of all actions <u>taken</u> by a respondent and dividing by the total of the usefulness indexes across all actions <u>available</u>. The EI score was designed to reflect the extent to which important actions were taken while at the same time avoiding unimportant actions; the EI score is derived by computing the mean usefulness index across

all actions taken by a participant. For the Berven and Scofield sample of 33 graduate students in rehabilitation counseling, the PI scores varied from 19.6 to 93.2 (M=63.5), and the EI scores varied from 49.2 to 89.0 (M=57.7).

With the computation of PI and EI scores, the overall performance of individual participants could be characterized in terms of their profiles on these two composite scores. As one additional step, Berven and Scofield (1980) used cluster analysis to group participants in terms of their profiles of PI and EI scores and defined general problem solving approaches. They defined two "thorough and discriminating" clusters of respondents who had high scores on both the PI and EI indexes (with all mean scores higher than 60.0), one giving slightly more emphasis to proficiency and the other to efficiency. The two remaining approaches defined were a "constricted" approach characterized by low proficiency (M=43.6) and high efficiency (M=73.9) and a "shotgun" approach characterized by high proficiency (M=60.9) and low efficiency (M=49.2). Thus, the composite scores and general approaches identified could provide valuable feedback on general problem solving styles indicated in student performance.

Another procedure which has not previously been applied to quantifying performance would be the use of discriminant analysis for qualitative variables (Klecka, 1978; Trampisch, 1976) to determine whether the performance of novice groups can be differentiated from criterion groups of experienced practitioners and, if so, the specific case actions that contribute most to that differentiation. This procedure could provide diagnostic information on the performance deficits of groups of novice respondents in terms of particular actions taken or not taken. Similarly, the information derived could assist in diagnosing performance deficits of individual participants and the classification functions could determine whether the pattern of actions taken is more characteristic of experienced practitioners or of more novice groups. This diagnostic information could then be used to assist in determining training needs of individuals or groups.

The quantification procedures discussed thus far have been applied to single-case management simulations. With multiple-case (caseload) management simulations summary statistics on a variety of measures can serve to quantify performance, such as acceptance and closure rates, caseload size, time delays in providing services, and case service expenditures. In

addition, discriminant analyses can be used to differentiate the performance of criterion from novice groups in terms of the measures listed above.

Psychometric Issues

As previously discussed, uses of case management simulations in assessing clinical problem solving and case management skills are predicated on their psychometric properties as assessment devices (Berven, 1985b). Reliability of performance scores derived from case management simulations indicates the minimization of measurement error and, consequently, the consistency of scores provided. Validity indicates the extent to which scores actually reflect clinical problem solving or case management skills possessed by participants.

Reliability

As indicated by Berven (1985b), the most important reliability consideration in the use of computer-based case management simulations relates to content sampling error--the extent to which scores are consistent across different cases simulated, rather than being highly dependent on specific case content. Content sampling error can be examined through alternate forms reliability estimates across multiple problems, or, equivalently, through internal consistency estimates

where a set of problems is conceptualized as a single "test" with the individual problems as the test items.

Berven (1985b) applied this method to examine the reliabilities of PI and EI scores derived from his three case management simulations. Repeated measures analyses of variance were conducted separately for the PI and EI scores attained by a sample of current and former students in rehabilitation counseling on the three simulations. Intraclass correlation coefficients were then computed, with between simulation variance excluded from the error term (Bartko, 1966; Ebel, 1951), providing estimates of the average reliabilities associated with the administration of one of the three simulations. To estimate the reliabilities of composite scores derived from the administration of all three simulations, the formula provided by Ebel (1951) was used which is equivalent to the Spearman-Brown formula. These analyses can facilitate decisions regarding the number of simulations which must be administered to achieve PI and EI scores which have acceptable reliabilities or consistency of measurement.

Using these methods, Berven (1985b) obtained reliability estimates of .525 and .484 for the PI and EI scores, respectively, from the administration of one of his three simulations, and .768 and .738 for the

composite PI and EI scores across all three simulations. In general, these estimates are higher than those in the .20s and .30s which have been found for patient management problems in medicine (Elstein, Shulman, & Sprafka, 1978; McGuire, Solomon & Bashook, 1976) and suggest that content dependence of case management simulations in rehabilitation counseling may not be as problematic. However, these reliability estimates also suggest substantial advantages in deriving estimates of problem solving or case management skills from the administration of several different single-case simulations.

Validity

According to Berven (1985b), content validity of case management simulations refers to the extent to which tasks performed in case management simulations and, consequently, the knowledge and skills required for performance, are representative of the task domain of actual rehabilitation counseling practice. Content validity is addressed primarily through careful construction of case management simulations, basing them on case information and materials from actual representative cases, and involving "experts" in rehabilitation counseling, including practitioners, in developing the simulation materials.

Construct validity of case management simulations refers to the extent to which performance scores on case management simulations related to other measures of the construct, clinical problem solving or case management skills. The most common measures of skills have been training and/or experience. Thus, if scores on case management simulations actually reflect clinical problem solving or case management skills, individuals with higher levels of training and/or experience should attain higher scores.

Research on the construct validity or patient management problems in medicine has consistently found the expected relationships between performance and levels of training among medical students (Hoare, Newble, & Baxter, 1982; McGuire & Babbott, 1967; Paiva & Korhonen, 1976; Rimoldi, 1961). However, the expected relationships between performance and experience have not always been found. In some studies experienced physicians have been found to perform better than medical students (e.g., Marshall, Fleming, Heffernan, & Kasch, 1982; McLaughlin, Carr, & Delucchi, 1980), while in other studies the reverse has been found (Friedman, 1973; Newble et al., 1982). In reviewing early research in this area, McGuire et al. (1976) suggested that experience may be positively

related to scores on patient management problems emphasizing treatment and management, while experience may be negatively related to scores on those emphasizing diagnosis. McGuire et al. (1976) go on to point out that these findings may be consistent with studies of physicians in office settings which have found that more highly experienced physicians are more likely to take diagnostic shortcuts, sometimes to the detriment of accurate diagnosis.

Berven (1985b) examined differences in scores on his case management simulations between three groups varying in training and experience - undergraduate and graduate students in rehabilitation counseling and experienced rehabilitation counselors who had already completed master's degrees. In general, undergraduate students were found to attain lower scores than either of the other two groups, as expected, but differences were not found between the graduate students and the experienced practitioners, similar to the previously discussed results with patient management problems in medicine. These results were interpreted as suggesting that this set of case management simulations may tap relatively basic skills and, consequently, that they may be most appropriately used with more novice

individuals, such as undergraduates and beginning graduate students in rehabilitation counseling.

Research on the validity of case management simulations is hampered by the lack of good measures of competence against which to compare scores attained on simulations. Training and experience are not particularly good indicators because of the high variability in competence among practitioners with comparable levels of training and experience, making it very difficult to detect differences between levels. Other indicators of competence may also have significant limitations.

Another potential indicator of competence would be ratings by individuals presumably familiar with the performance of practitioners, such as their peers, supervisors, and clients. Such ratings may be highly subjective and may reflect characteristics other than competence. Caplow (1954) has suggested that ratings by peers may reflect actual professional competence, while ratings by supervisors may be heavily influenced by conformity to rules and regulations and those of clients by popularity. McClelland and colleagues (e.g., McClelland & Boyatzis, 1980) have suggested that peer nominations of superior performers can provide a good criterion of competence, finding that, within a

variety of different groups, a few individuals are repeatedly nominated while others are seldom, if ever, nominated. The "superior" performers can then be compared to "average" performers who are not repeatedly nominated in terms of their performance on a simulation presumably assessing clinical problem solving skills.

Measures of actual work performance can provide other alternative criteria of competence. Samples of work performance can observed and evaluated through observation of live or tape recorded samples of actual professional practice behavior or through review of casefile information in order to rate professional competence. A significant limitation of work samples is the variability in clinical situations across practitioners which can contribute substantially to the variability in performance observed making it difficult to assess the contributions of professional competence to performance. Similarly, assessment of competence in terms of outcomes achieved by clients served can be influenced by variability across practitioners in case difficulty and other factors influencing client outcomes. Attempts to partial out the influence of these extraneous factors can be difficult at best.

Finally, standardized instruments assessing different abilities and skills which would be

presumably related to clinical problem solving skills could be used as criteria of competence. In addition, other measures of presumably unrelated abilities and skills could also be used in order to examine both convergent and discriminant validity associated with scores on case management simulations.

Norms

In addition to quantification of performance, some basis of comparison is often needed to evaluate performance on simulations. With some types of simulations ultimate criteria for performance may be available. For example, with some patient management problems the diagnosis of the simulated patient's condition may be known and the accuracy of a subject's diagnosis can serve as a performance criterion (e.g., Piave & Korhonen, 1976). As another example, with some patient management problems in medicine which have dealt with life threatening conditions, it may be possible to determine whether certain actions or combinations of actions would probably result in the death of the patient, establishing an ultimate "pass-fail" criterion (e.g., Johnson, Moller & Bass, 1975). In rehabilitation counseling it is not as easy to reliably predict outcomes of certain actions. However, it may sometimes be possible to identify certain

actions which are critical to a successful outcome, and establish pass-fail criteria on the basis of those critical actions.

Norms can provide an alternative basis to evaluate performance. If a simulation has been administered to a variety of groups of students and practitioners at different levels of training, experience and competence, comparison to those norm groups can facilitate evaluation of the developmental level of subject skills. Identification of actions which best discriminate groups at different levels could also provide helpful information in evaluating the performance of a particular individual. At present, norm groups available for comparison in using existing simulations are limited to one or two small samples with questionable representativeness to any group of interest. The development of more useful norm groups would be very helpful in promoting the wide-spread use of case management simulations.

Future Research

One important area of research and development is the writing of new case management simulations representing a variety of cases in terms of such features as disability type, case complexity, and information provided. New simulations developed should

be written for the most commonly available microcomputers to facilitate their wide-spread use in as many rehabilitation education programs as possible, both for student training and assessment. One approach that would facilitate the development of new simulations would be the creation of simulation-writing computer programs, essentially specialized authoring systems like those currently available to develop tutorial lessons (e.g., see Hosie & Smith, 1984). The availability of such programs would make the development of case management simulations much less laborious and would also make it possible for individuals with only limited skills in computer programming to develop simulations by merely preparing and entering the case information.

Most of the simulations developed thus far have been single-case management simulations. Additional multiple-case management simulations should also be developed, representing variation in caseload sizes, types, time constraints, and available funds and resources, in order to train and assess skills in managing entire caseloads. Such simulations would complement single-case management simulations in focusing on different, though related, skills which are

also important components of professional competence and effective practice.

Similarly, the computer-based simulation approach could be applied to other related professional skills. For example, simulations could be developed to teach and assess skills in administering, scoring, and interpreting assessment devices, such as work samples or individual intelligence tests, where standardized administration is required and many judgments must be made during the administration and scoring process. At a more global level, simulations could be developed involving the design and conduct of entire evaluations.

Increasing sophistication should also be a goal as new simulations are developed. Berven (1987) has discussed the concept of fidelity as it applies to simulations in terms of both stimulus and response characteristics. Fidelity refers to the extent to which a simulation approximates reality in terms of stimuli presented and task demands. For example, the Berven (1985b) simulations enhanced fidelity over the earlier Berven and Scofield (1980) simulation by increasing the range of available case service actions, allowing for simultaneous actions, providing progress reports rather than single reports for some actions, and keeping track of time in terms of case service

weeks, among other features. Although computer-based simulations will always be artificial, enhancing their fidelity should correspondingly enhance their value as training and assessment tools. The addition of interactive video could be an important step forward in providing important visual stimuli, improving simulation fidelity in approximating actual clinical practice.

Given the limited research that has been conducted on computer-based case management simulations, their application as assessment tools would currently be premature. More research is needed to develop more sophisticated procedures for the appropriate quantification of performance and to develop a variety of norm groups to use in interpreting performance. Most important is continuing research on the reliability and validity of case management simulations as assessment devices to document their value in a variety of potential applications. New measures of case management skills are needed to use as a basis of comparison in validating simulation scores, and some promising new approaches have been discussed earlier in the present paper.

Research on training applications of computer-based case management simulations has not even begun.

Although the experience of participating in simulations would seem helpful in acquiring and refining skills in case management, such training effects needs to be document. Further, the efficiency and effectiveness of simulations as training tools relative to other methods should be investigated as well as their integration with traditional instructional methods.

Finally, case management simulations can be used in research to better understand clinical problem solving and decision-making processes (see Butcher & Scofield, 1984). By having "expert" practitioners "think aloud" as they make decisions and take actions in completing a case management simulation, the clinical problem solving processes contributing to effective clinical practice can be examined. To the extent that these processes can be understood, efforts to train students in becoming more effective problem solvers can be developed and refined.

The application of computer-based case management simulations in rehabilitation education is still in its infancy. Eventually, simulations may become standard tools for training students in rehabilitation in case management skills and in evaluating their skills in performing those functions. Simulations could potentially be used as exercises to practice and refine

case management skills and as evaluation procedures in course examinations, comprehensive examinations required for graduate degrees, and credentialing examinations in certification and licensure. Continued research and development will be required if the potential benefits of simulations are to be realized.

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2. Research Report

DEVELOPMENT AND VALIDATION OF A COMPUTERIZED CASELOAD MANAGEMENT SYSTEM

by

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THESIS

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Section 1. Review of the Literature

INTRODUCTION

The field of rehabilitation counseling provides an array of services to the disabled population. As a result of this diversity of service provision, the training for the rehabilitation counselor at undergraduate and graduate levels must be a diverse and multifaceted experience (Wright, 1980).

Among the skills necessary for the rehabilitation counselor to gain during the training process are clinical competencies. Included in this area are counseling, assessment, and job placement skills, along with a host of other competencies all related to working with an individual client, with a strong emphasis on the actions required to assist the client. The clinical abilities are an extremely important function of the rehabilitation counseling process, and have a prominent place in the counselor education process.

An area of concern for the rehabilitation counselor separate from the clinical skills is caseload management. The typical rehabilitation counselor is responsible for provision of quality services to large numbers of clients with a wide range of disabling conditions (Cox, Connolly, & Flynn, 1981). In order to efficiently provide services to

these groups of clients, training in the areas of problem solving, time usage, budgeting, communication, and use of documentation as they relate to caseload management is required (Chan, Parker, Lam, Mecaskey, Malphurs, 1987).

The rehabilitation counselor associated with a state vocational rehabilitation agency has the responsibility for management of large numbers of cases. In providing services for the clients, the counselor is required to generate movement of the case through a series of statuses, with the ultimate goal of the rehabilitation process being attainment of a successful closure in status 26. A successful closure is defined as sustained employment for a sixty day period. In order to work successfully with this large number of clients, the rehabilitation counselor must be able to manage their caseload efficiently and effectively (Cox et al., 1981).

Despite the importance of case management skills, there are extremely limited levels of training provided in this important area in counselor education programs. This may be because case management skills are more easily learned while on the job (Chan et al., 1987); however, training in caseload management should improve counselor skills. One possible method of

training would be through the use of computer simulation.

The advent of microcomputer technology has made the use of the computer in a variety of settings feasible (Chan, et al., 1987). One of the uses for the computer is in simulations for the purpose of training. This is known as Computer Assisted Instruction (CAI). CAI has been used extensively in training in a number of fields, including the counseling field (Berven & Scofield, 1980).

In computer simulations, the trainee interacts with the computer as if the actual job situation was taking place. This enables the student to gain practice and information without actually taking on the task.

Computer simulations developed so far have been utilized to assist the student manage a single case through the rehabilitation process (Berven,1985). In the "real world" of a rehabilitation counseling, the counselor must deal with a large number of clients.

Purpose of the Study

The purpose of this study is the development and validation of a computerized caseload management system. A program will be developed which will

simulate the responsibilities of a state vocational rehabilitation counselor. The validity of this simulation as a training and assessment instrument will be validated through the testing of the following hypothesis:

There will be a significant difference between the performance of rehabilitation counselors and the performance of graduate and undergraduate students on the simulation.

Validation of the hypothesis would establish the computer simulation as an educational device which could be utilized to fill the gap in the education of the rehabilitation counselor, the lack of training in caseload management skills.

LITERATURE REVIEW

Caseload Management

The caseload management system is widely used in many facets of the provision of vocational rehabilitation services. While it is mandated in the state vocational rehabilitation agency, this method is utilized in a variety of public and private rehabilitation agencies (Kemp, 1981). According to Greenwood and Rubin (1979), systematic caseload management at state agency levels encompasses several basic responsibilities.

Intake interviewing involves obtaining necessary information to enter the client into the rehabilitation process. Eligibility determination is the obtaining of adequate information to determine if the client meets the criteria for admission into the rehabilitation process. This involves use of a number of diagnostic techniques, including medical, psychological and vocational evaluations. Development of the rehabilitation plan is a process whereby the counselor and the client establish the rehabilitation goals and the method for achieving them. The next phase of the process involves the arranging and purchasing of the services which are necessary to accomplish the goals. Services include counseling,

physical restoration, transportation, housing, and job training. Typically services are provided by other health care professionals, such as physicians, psychologists, social workers, and rehabilitation counselors outside of the state system.

In coordinating the case, the counselor moves the client through the required statuses, based on which phase of the process the client is involved in. The statuses,as defined by The Texas Rehabilitation Commission (1980) are:

Status 00 Referral. A client is placed in this status when a referral is received, with the following information being furnished: Name and address; disability; date of referral; and source of referral.

Status 02- Applicant. A client who has completed a signed application is placed into this status. In this status, the decision is made whether or not to make the client eligible for services, or to place the client in extended evaluation.

Status 06- 18-month evaluation. The client is placed in this status when the counselor is unable to determine eligibility during status 02. The client can be in this status for as long as eighteen months; however, the counselor should determine eligibility as quickly as possible. During this status the counselor

can utilize a wide range of diagnostic services, though services towards enhancing employment may not be utilized in this status.

Status 08- Closure. Clients not accepted for services are placed in this status.

Status 10- Program Development. A client is placed in this status after being accepted for services, while his or her Individual Written Rehabilitation Plan (IWRP) is being formulated.

Status 12- Program completed. The client is placed in this status when the IWRP has been completed.

Statuses 14, 16, 18- Action statuses. These are the statuses in which the actual services are provided. In status 14 counseling and guidance is provided by the rehabilitation counselor. In status 16, physical or mental restoration is provided. In status 18, training is provided. This can be training in school settings, training under employment conditions, training at a facility, or personal/social and work adjustment training.

Status 20- Ready for employment. A client is placed in this status when he or she has completed preparation for employment.

Status 22- In employment. A client in this status has been placed in employment, but has been employed for

less than sixty days.

Status 24- Services interrupted.

Status 26- Closed rehabilitated. The client in this status has maintained employment for a sixty day period and is considered to be rehabilitated.

Status 28- Closed unsuccessfully. A client who is closed after services are provided, without being rehabilitated is placed in this status.

Status 32- Post-employment services. Within this status, services may be provided after being closed rehabilitated.

Status 34- Conclusion of post-employment services. The client is placed in this status when services are terminated for any reason.

Caseload management appears to be effective in expediting the provision of services (Kemp, 1981). Wright, Reagles, and Scorzelli (1973) compared provision of services to juvenile delinquents utilizing the case management and unstructured service provision systems. The case management system appeared superior in the provision of service.

Roessler and Bolton (1978) compared three methods of service provision. In the traditional group, no coordinated case management activity took place. The coordinated group emphasized case management skills,

but did not provide for direct contact between the client and the case manager. The coordinated/case management group utilized counselors trained in caseload management, who worked with the clients towards meeting goals. The study was not able to distinguish between the groups in regard to need satisfaction or personal growth; however, there was evidence of increased efficiency in the more coordinated groups. There were significant differences on the physiological, family, and social subscales of the Human Service Scale, as well as differences in self esteem, with the coordinated/case management group having the highest level of change, and the traditional group having the lowest.

Greenwood and Rubin (1979) evaluated current caseload management practices and reported on several factors influencing management. One report found most delays in service delivery were caused by poor caseload management skills. Reports also indicated that a severely disabled individual with service interruption had only a one in four chance of becoming employed.

Caseload Management Training

Farley (1980) evaluated the effectiveness of a

training program designed to increase the case management skills of rehabilitation counselors. The training program involved short-term (three day) inservice training programs. The effect of the program on cognitive development, affective reaction, and on the job performance was evaluated utilizing a pre-test, post-test control group design. The group receiving the training demonstrated improvement in all three of the dependent areas at a rate significantly above the control group. The only area of job performance tested which did not indicate improvement was moment to moment response style.

The Arkansas Rehabilitation Continuing Education Program (1982) has developed a caseload simulation for the purpose of training caseload management skills. This is not a computer simulation, but is rather a paper simulation. The trainee is given a file with a list of fifty cases, each providing information regarding the client. Further cases are provided through referrals provided to the trainee. The trainee is required to purchase services for the individual clients, constrained by limited financial and time resources. Each action taken may have a financial or a temporal (counseling session) cost to it. Concurrent with service provision, the trainee

must move the clients through the various statuses appropriately.

The simulation is divided into seven periods, and at the end of each period (when all the counseling sessions are used up), a sheet of the caseload activities is presented to the trainee. This lists all the activities which have taken place, and includes more than one possibility, based on the past actions taken. Examples of case activities are as follows. "Lavinia gets a job as a secretary. You may move her to status 22 this period", and "If you worked on Saul's transportation problem last period, his employer retains him and you may close his case in status 26..."

All actions taken by the trainee are approved by a person playing the role of the supervisor. The supervisor checks that the case movement is correct and falls within the established guidelines with respect to statuses. In addition, actions are checked against feasibility charts to determine whether the action taken will have a positive or a negative outcome.

The goal of the simulation is to efficiently provide as many services as possible, to obtain as many status 26 closures as possible, to distribute

cases appropriately throughout the statuses, and to generate new referrals. There have not been publications of the efficacy, reliability, or validity of this training program.

Computer Simulations in Fields Other Than Rehabilitation

Computer simulations have been used extensively in training in a variety of health science fields other than rehabilitation. Sweeney, O'Malley, and Freeman (1982) developed a system for training and evaluation of the clinical performance of nursing students. The system presented one of a number of simulated cases to a nursing student. The student was then required to interview "the patient" (the computer program), and to acquire the relevant information. Improper queries were not rewarded with information. Appropriate acquisition of laboratory tests was also required. The authors felt this approach was helpful in the training and evaluation of nursing students.

Computer simulations have been utilized to provide medical students with an opportunity to apply the basic science knowledge they have gained in the didactic portion of medical school in a "quasi-clinical" setting (Blanchaer, 1985). In the simulation designed in this study, the student assumes

the role of doctor, and must identify and treat the patient's medical ailment. Feedback is provided to the user, as non therapeutic actions cause "the patient" to get worse, and inappropriate actions will not result in meaningful information. The importance of making the computer program itself non-threatening and simple to operate was noted in the study.

Fryback (1986) created and tested a computer simulation program to train and provide feedback for physicians in the area of probability estimation. Probability estimation involves establishing the likelihood of a specific disease or disorder, and of certain clinical findings. In this study, the trainee is presented with a computer generated patient, and is supplied with diagnostic information. The physician is then requested by the computer to provide probability estimates for specified conditions. Feedback is then given on the calibration and effectiveness of the estimate. Standards are set by the Board Examination in General Internal Medicine. Anecdotal use of the program indicated is a potentially valuable tool in training physicians to enhance their diagnostic skills. The article stated further research to validate this hypothesis is necessary, and is planned.

Modell (1985) has established a series of simulations in respiratory physiology to provide students with laboratory experiences. In this simulation, students can establish values for varying respiratory processes and view the computer simulation of the results of the action. The program was utilized to review material presented in lectures, and to help answer questions. The author feels that the computer simulation of respiratory systems has been an important and powerful teaching tool.

Carew, Elvin, Yon, and Alster (1985) utilized CAI to teach an introductory course in nutrition, and evaluated its effectiveness in enhancing education. Over ninety five percent of the students in the program felt the simulation was helpful to them. The students who participated in the program scored, on average, five points higher than students who did not participate. The significance of this data is in doubt, since there was no random control group, with participation in the CAI project on a voluntary basis within the class.

Computer Simulations in Rehabilitation

Computers are being used more and more extensively in the rehabilitation field. There are a number of applications for the computer to facilitate

the job of the rehabilitation counselor, including training. Chan and Questad (1981) researched a training system for novice vocational evaluators. The limited experience of the novice evaluators create difficulties following a systematic assessment strategy, and the lack of practical knowledge to draw on limits the interpretation of the results of assessment procedures.

Chan and Questad's simulation has two primary portions. In the UPDATE portion of the program, experienced evaluators enter information regarding specific cases they have encountered. Information entered includes disability and ability levels. The vocational evaluator then enters hypotheses, the evaluation strategy for testing the hypotheses, and the results of the testing. In the SEARCH portion of the program, the novice evaluator enters the information for the client he or she is having difficulty with. The computer finds a similar case, and enables the novice counselor to see an experienced counselor's strategy.

Several computer simulations have been developed to train rehabilitation counselors in case management skills. An example of such a program is Genesis II (Chubon, 1986). In the Genesis program, the trainee

can choose between varying disability types. The computer, utilizing randomization to make each case unique, constructs a simulated client. The trainee manages the case through a typical case management sequence. As the program progresses, the student receives feedback from the computer regarding the outcome of their actions. Inappropriate choices will register error messages, and when totally inappropriate choices are made, the program will "crash", necessitating the rebooting of the system. The author felt Genesis II to be a powerful, yet primitive device for teaching case management skill to student counselors, and felt further research necessary to enhance the quality of software available.

Berven and Scofield (1980) developed another example of a single case simulation program. This simulation involved data presented on a client. The participant is given a menu of twenty one evaluative services to choose from. Each service provides information regarding the client. The participant continued to choose services until they felt they were able to complete an eligibility statement, including primary and secondary disability, whether the disability resulted in a substantial impairment to

employment, whether a reasonable chance of the client being helped by vocational rehabilitation services existed, and the probability that the client would become successfully employed.

Two indices were developed to rate the quality of responses, proficiency and efficiency. The proficiency index (PI) was established by evaluating the actions taken by a group of experienced counselors and comparing the participants scores to that norm. The efficiency index (EI) was established by comparing the number of actions taken be a participant to the average taken by the control group of experienced counselors.

The validity of the program for use as a training tool was established by contrasting the performance of a criterion sample, composed of experienced rehabilitation counselors, a high training/experience group composed of graduates of a rehabilitation counseling program, moderate training/experience composed of graduate students in rehabilitation counseling, and low training/experience consisting of undergraduate students. There was significant differences in performance on both the PI and the EI based on experience; however, the difference was primarily at the lower experience levels. The

simulation was less sensitive towards discriminating individuals with high but differing levels of experience.

Chan et al. (1987) adapted the program for use on a microcomputer. He tested the simulation with a group of undergraduate students and found significant differences between the strategies utilized by the students and those used by the criterion group. Chan described difficulties using the PI and the EI as criteria, as they tended to be inversely related. Because of this inverse relationship, it is not possible to perform at high levels on both indices.

There are a number of different areas in the rehabilitation field in which computer simulations could be of value (Berven & Scofield, 1980). One of these areas is research. Research involving the effectiveness of different styles of counselor education could easily be facilitated by use of different forms of CAI. Counselor education is another area in which computer simulations have enormous potential. Berven and Scofield also mention certification, licensure, and professional employment as places in the rehabilitation counseling world in which computer simulation can play a role. Differing simulations may be a better method then currently

exists for determining the abilities of counselors.

Psychometric Issues

The effective use of computer simulations in rehabilitation requires the psychometric properties (reliability, validity and norms) of the instruments to be established (Berven, 1985). Computer simulations differ in many ways from traditional psychometric measures, requiring modification of the methods for determining psychometric properties (Chan, Berven & Lam, 1988).

Berven (1985) indicated the most important reliability question associated with computer simulations is the extent to which skills measured are consistent across different simulations, as opposed to being content dependent. This reliability can be measured using alternate forms or internal consistency methods.

Berven (1980) evaluated alternate form reliability of a single case simulation. He developed three individual cases for the simulation. He administered the three forms to his sample groups, and evaluated the reliability as if the three cases were separate psychometric tests, using the formula provided by Ebel (1951).

Chan, Berven and Lam (1988) proposed a method for establishment of internal consistency reliability of a single case simulation, using Berven and Scofield's (1980) case simulation as an example. There were 21 possible actions which could be taken on the simulation. Each of these actions was rated as appropriate, somewhat appropriate, or unnecessary by a panel of experts. Each of these actions was then treated as an individual test item to establish internal consistency reliability.

Validity of the case management simulations concerns the extent to which performance of a simulation reflects actual clinical skill levels (Berven, 1985). Content validity, the extent to which the simulation represents the actual tasks of a rehabilitation counselor, is an important consideration in simulations (Berven, 1985). Content validity can be established through careful construction of case management problems, including use of actual client materials and consultation with experts (Chan et al., 1988).

Criterion related validity must be also be established. Berven (1985) suggested that comparison of performance on simulations and other indicators of competence, such as experience and training can be

used to establish validity. According to Berven, a program should be able to discriminate between experienced and inexperienced counselors if it is to be considered valid.

Chan et al. (1988) suggests that development of norms is needed for the accurate interpretation of scores on computer simulations. Scores on computer simulations, as with any psychometric measure, have meaning only when they can be compared with an appropriate set of norms. Chan et al. (1988) notes that the development of norms in computer simulations in rehabilitation has been significantly overlooked.

Summary

Computer simulations appear to be a useful tool for teaching, particularly in the area of case management skills. Current software developed in this area has been focused primarily on single case simulations. The fact that rehabilitation counselors consistently deal with large number of clients is overlooked. There is a need for the development of a caseload management system. The review of the literature supports the need for the current study.

Section 2. Research Report

Abstract

A computerized caseload management simulation was developed for use in training caseload management skills to students of rehabilitation. The simulation presents eight cases for trainees to manage through the statuses of the state vocational rehabilitation system, including ordering diagnostic information and treatment and training services. The completed simulation was presented to a a group of state vocational rehabilitation counselors and a group of graduate and undergraduate rehabilitation students. The results of the participants performance on the simulation was submitted to statistical analysis. A discriminant analysis was performed, and a significant function was found which distinguished between the performance of students and counselors. The counselors performed with superior caseload management skills in several important areas.

Development and Validation of a Computerized Caseload Management Simulation

The field of rehabilitation counseling frequently requires the provision of services to large numbers of clients with a wide range of disabling conditions, issues and circumstances (Cox, Connolly, & Flynn, 1981). In particular, state vocational rehabilitation counselors have a large caseload of clients to whom they must efficiently provide services. In order to successfully work with the many clients, the counselor must make use of effective and efficient caseload management skills (Cox, Connolly, & Flynn, 1981).

Caseload management is a system that is widely used in the rehabilitation field. While mandated in the state vocational rehabilitation agencies, it is used in different ways in a variety of public and private agencies (Kemp, 1981). Effective caseload management skills appear to have significant effect on the quality of service provision. For example, Wright, Reagles, and Scorzelli (1973) compared provision of services to juvenile delinquents utilizing case management and unstructured service delivery. The case management system appeared to enable a superior provision of service.

Roessler and Bolton (1978) compared different groups of service providers, with varying levels of case management being utilized to provide services. The group with the highest level of case management provided demonstrated the highest level of change in the factors measured.

Greenwood and Rubin (1979) evaluated caseload management practices and reported on factors influencing management. It was found that most delays in service delivery were caused by poor caseload management skills. The study also indicated that service interruption had serious effect on probability of successful rehabilitation of severely disabled individuals.

In spite of the large amount of caseload management activities required of a counselor, little emphasis is placed on training in this area in graduate and undergraduate training programs in rehabilitation, with the emphasis primarily placed on clinical skills (Chan, Parker, Lam, Mecaskey, & Malphurs, 1987). Chan et al. (1987) hypothesize this is because caseload training may be more easily learned on the job, and is difficult to teach in the classroom. It does appear, however, that training can be utilized to improve caseload management skills

(Farley, 1980). A short term training program was found to improve several factors important to job performance.

The Arkansas Rehabilitation Continuing Education Program (1982) has developed a standardized caseload simulation for the purpose of training caseload management skills. A participant utilizing the simulation is given a file of fifty cases, with significant information provided. The participant is required to purchase services for the individual clients. They are limited by financial and temporal resources. The simulation has seven periods, and each period provides information regarding the clients to the participant.

All actions taken by the participant are approved by a supervisor, who checks the action against feasibility charts to determine if it is to be successful. The goal of the simulation is to successfully close as many cases as possible.

A method which may be helpful in training caseload management in an academic environment is computer assisted instruction (CAI). Computer aided instruction has been shown to be an effective teaching method (Braun, 1980, Frenzel, 1980). With the advent of personal computer technology, CAI has become more

affordable, and thus more readily available as a tool, resulting in a resurgence of interest in the uses of CAI in education (Berven, 1985a; Chan & Questad, 1981).

Standardized computer simulations have been found to be an effective method for evaluating the level of a professional's competence. In standardized clinical simulations, an individual faces a situation and is able to behave as they would in an actual situation. The performance of the individual in the simulated situation is evaluated without potential threat or inconvenience to clients.

Clinical simulations have been utilized extensively in many health care fields other than rehabilitation. Sweeney, O'Malley, and Freeman (1982) developed a system for evaluation of the clinical performance of nursing students. In this simulation, nurses obtained information from simulated patients, and ordered appropriate laboratory information. The authors felt the simulation was helpful in training and evaluation of nursing students.

Computer simulations have been utilized in medical education, to enable medical students to apply didactic education gained in basic science portions of medical school, to "quasi-clinical" settings

(Blanchaer, 1985). In the simulation designed in the study, medical students must accurately diagnose and treat the simulated patient's disorder. Unindicated actions cause the patient's condition to worsen, while appropriate actions result in improvement. The importance of making the computer program non-threatening was noted in the study.

Respiratory physiology simulations have been established to provide students with laboratory experiences (Modell, 1985). In the simulation, students establish values for varying respiratory processes, and are able to visualize the results of their actions.

CAI has proven to be an effective tool in education of clinical nutrition students (Carew, Elvin, Yon, and Alster, 1985). A simulation was used as an adjunct to classroom lectures, and resulted in an improvement in student grades.

Within the field of rehabilitation, there has been use made of single case computer based simulations (Berven, 1985b; Berven & Scofield, 1980a, 1980b; Chan, et al., 1987). Berven and Scofield (1980b) first presented a single case simulation, involving a male client with a seizure disorder secondary to head injury. Participants in the study

assumed the role of rehabilitation counselor, and were required to take the actions necessary to determine eligibility. These actions include various medical diagnostic services, vocational evaluation, education history, and up to 6 client interviews. The participant requests the information from a menu on the monitor. After completion of the simulation, the participant's performance is evaluated on two measures, a proficiency index and an efficiency index. The proficiency index (PI) index was established by evaluation of the actions taken by a criterion group of experienced counselors and comparing the participants scores to those norms. The efficiency index was established by comparing the number of actions taken by a participant to the average number taken by the criterion.

Berven & Scofield (1980b) evaluated a group of students, and found significant differences in efficiency and proficiency of case management. Chan et al. (1987) adapted the program for the microcomputer, and described the performance of a sample of undergraduate students in rehabilitation.

Berven (1985b) developed three additional cases to study the reliability and validity of the computerized case simulation. Complexity of the

simulation was also increased, with the range of options being enhanced. Results of the study indicate that single case simulations can be utilized successfully as a method of assessment.

While the single case simulation is a valuable training tool in clinical decision making skills, it is limited in its ability to train the counselor in appropriate caseload management skills. Factors such as time management, proper case flow, and budgeting are not incorporated into single case simulations. These elements could be incorporated into a multiple case simulation. A simulation which would enable a trainee to acquire improved caseload management skills would likely be a valuable component of rehabilitation education.

The purpose of this study is to develop and validate a multiple case caseload management computer simulation to utilize as a training tool in the education of rehabilitation counselors. The program will simulate the caseload management responsibilities of a state vocational rehabilitation counselor.

Method

Participants

Thirty six participants took part in the study, and were comprised of two groups; a group of experienced

counselors and a student group. All participants were volunteers. Students were recruited from two major universities in the Dallas/Fort Worth/Denton area, and counselors were recruited from the Dallas region of the Texas Rehabilitation Commission (TRC). The participants were divided into the two following groups.

1. Student group. The student group was comprised of 18 individuals currently attending either an undergraduate program in rehabilitation service or a graduate program in rehabilitation counseling at one of two major southwestern universities. Each of the students had completed an introductory course in which caseload management was reviewed, and had participated in at least one clinical practicum, as a part of their coursework. Eight of the students were undergraduates, the remaining 10 were graduate students. Mean age of the students was 31 years (SD=8.4). Sixteen students (83%) were female.

2. Counselor group. The counselor group consisted of 18 TRC Counselors. Counselors were selected based on availability during the testing time scheduled for their regional office. Twenty-two percent of the counselors were designated senior counselors. Seventeen percent were certified rehabilitation

counselors. Mean age of the counselor sample was 42 years (SD=8.4). Ten (55%) of the counselors were female. Average amount of work experience as counselors was 7.8 years (SD=6.1). Seven of the counselors (39%) held a masters degree in rehabilitation counseling, two (11%) held a bachelors degree in rehabilitation services, and nine (50%) held other degrees.

Computerized Caseload Simulation

A computer caseload simulation was developed for the study, utilizing case materials from actual clients served by the Texas Rehabilitation Commission. Simulated cases were developed from the caseload of one counselor, and were selected to provide a variety of disabling conditions and client backgrounds. Client information was gathered from examination of case records of both active and closed cases. Information gained from the case record included medical information, social and occupational history, diagnostic evaluation information, treatment/service information and case outcome. From this information reports and histories were generated. These were not duplicates of those existing in the record, but were rather brief statements which summarized the information. Modification of information was made to

maintain client confidentiality. Fictional names were assigned to each of the cases.

Nine cases were developed. The simulation has the potential to handle an unlimited number of cases, to provide a realistic caseload management experience. For the purpose of the pilot study, only a limited number of cases were developed due to time constraints of the participants in the study. The number of cases developed enabled the simulation to be completed in the target time of approximately one hour. Eight cases were designated for management during the course of the simulation. The remaining case was for demonstration purposes. A brief synopsis of each case used for the purpose of the simulation follows:

Case 1. A thirty four year old married female, referred by her mother. She was referred with a primary disability of a seizure disorder, and a secondary diagnosis of depression. In addition, the client had multiple sclerosis; however, this diagnosis was unknown at referral, and could be discovered through diagnostic services. The client was seeking funding for psychotherapy, as depression was impairing her ability to work. She had worked as a counselor, and had a Masters in Social Work. Status at onset of simulation- 02.

Case 2. A twenty five year old male with a hearing disorder, referred by an audiologist. This client was employed as an optician but required a hearing aid to maintain employment. The client was seeking assistance in purchasing the hearing aid. Status at onset of simulation- 02.

Case 3. A thirty six year old self referred married male. The client presented a poor work history. The client claimed a disability of a hand injury, with nerve impairment, secondary to an on the job injury. Medical reports available did not document a vocationally impairing disability. Status at onset of simulation- 02.

Case 4. A 17 year old male referred by a friend. The client has a diagnosis of emotional disability, with a history of acting out behavior. Diagnostic information indicated a need for psychiatric treatment, and a structured, sheltered work environment. Status at onset of simulation- 22

Case 5. A 47 year old male referred by the multiple sclerosis society, with a diagnosis of multiple sclerosis. The client had worked as a self employed interior designer, and had a masters degree in art. This work was too strenuous in light of the disability. The client was seeking counseling.

information in the case file indicated teaching art to be a valid vocational objective, requiring college level work to obtain teaching credentials. Status at simulation onset- 14.

Case 6. A 19 year old married female referred by her church with a mental health disability. She desired training to be able to function in a data entry field. Early in the simulation, the client leaves the state, and wishes the case closed. Status at simulation onset- 02.

Case 7. A 26 year old single self referred female with a primary diagnosis of cerebral palsy, and a secondary diagnosis of visual problems. The client presented a vocational history demonstrating difficulty with work appropriate behaviors. The client was seeking training in a clerical field. The client acquires a job midway through the simulation. Status at simulation onset- 20.

Case 8. A 42 year old married male referred by his physician with a disability of a back injury secondary to an on the job injury. The client has a history of 21 years of employment as a truck driver. He is seeking training as a locksmith. Status at simulation onset- 18.

Each case was evaluated for the most appropriate

case management path for the optimum outcome. This was determined by actual case outcome, and analysis of total case information. Simulated reports for any actions that would likely to be needed to process the case were prepared. These were adapted from actual reports, or when not available, were developed to be consistent with overall client data. Examples of reports included applications, interviews, medical diagnostic reports, and different service reports, including physical and mental restoration service and training reports.

The eight cases were used as a basis for the computer simulation. The simulation was programmed in the language BASIC, and was written for IBM PC and PC compatible hardware. The computer simulation is divided into 10 periods. Each period was considered to be the equivalent of one half month of real time. Each action a participant can take in the simulation has a time and money value. When the participant has taken actions totaling 15 hours in a given period, the period advances to the next period. Fifteen hours was selected, as the eight cases only represents a portion of a caseload. After period 10 the simulation ends. In the simulation, there is no limit on spending, but the cost of services provided is monitored.

For each period, there is a set of activities which accompanies it. The activities are divided into two basic categories, client contacts and unscheduled activities. Client contacts are messages from the simulated clients which provide information, such as "Client 7 has found a job and is starting work immediately", or "Client 6 has left town to seek inpatient treatment, and does not wish to receive services at this time." Unscheduled activities are time consuming activities, such as meetings and staffings which commonly take time from the rehabilitation counselors work time. An example would be "You have a staffing with one of your clients. This takes two hours." The times taken by unscheduled activities are deducted from the total time available in a period.

During three periods, there is also an optional activity presented. These are for the purpose of potential job development or community relations, and the participant performing the simulations may either utilize time to take part in the activity, or choose to decline. An example of this is "The personnel manager at Allied Computers calls, and wants you to speak to a managers meeting about hiring the disabled. If you decide to do this, it will take a half a day.

Do you wish to a)accept or b)decline the invitation?."

The simulation begins with presentation of case statistics, which display the list of client numbers, names, current statuses, amount of time in the current status, and amount of money spent on the client. These case statistics are updated throughout the simulation, and are available to view during the simulation. Following the caseload statistics, the period one activities are displayed, followed by the main menu.

Options on the main menu are to review the period activities, review the case statistics, or process an individual case. When the participant chooses to process an individual case, he or she is presented with a menu of options. These options vary, dependent upon the status that the client is in. As an example, in status 02, the participant may choose from the following options:

1. Review Application
2. Conduct Interview
3. Order Diagnostic Examinations
4. Review Current Reports
5. Check Client Finances
6. Change Client Status
7. Return to main menu

Differing actions result in different responses from the simulation. Reviewing applications, interviewing clients, counseling clients, and other

actions for which a counselor would receive immediate information result in the simulation providing the appropriate information to the participant. If diagnostic, physical/mental restoration, or training services are ordered, the participant receives a message that the service has been ordered. After a one period delay for diagnostics, or a two period delay for training or physical/mental restoration services, the participant receives a message in the period activities that the report has been received. At this time the participant can review the report using the review current reports or review case file option available in each status.

The participant may choose the change client status option. This will enable the participant to change the status. Only permissible status changes, as designated by the Rehabilitation Services Manual (Texas Rehabilitation Commission, 1980) are permitted. Illegal status moves result in an error message. In the simulation, statuses 00 and 02 are combined, as are statuses 10 and 12.

After 10 periods, the simulation ends. All actions taken by the participant are recorded on a computer disc by the computer.

Several criterion measures were utilized in

assessing the participant's performance. The Preferred Action Index (PAI) was assembled, utilizing policies of the Texas Rehabilitation Commission (1980), actual case outcome, and information from an advisory group of rehabilitation educators. Actions considered important and necessary were determined for each action, and participants were given one point for taking each action. Points are deducted for status changes considered to be unnecessary. The PAI is a total of the points for each of the clients. As an example of the PAI score for an individual case, for client number two participants would receive a point for ordering a general medical examination, an audiologist examination, correctly identifying the primary and secondary disability, and the best vocational objective in the IWRP, ordering a hearing aid, changing to status 10/12, 16, 22, and 26. Points would be deducted for moving the client to status 06, 08, 14, 18, or 24.

Participants were also assessed on the number of illegal status moves attempted (e.g. trying to move from status 02 to status 20, without provision of service), the amount of money spent, the number of appropriate closures (movement to status 08 in cases three and six, or movement to status 22 or 26 in other

cases), the number of actions taken, and the total number of status moves made.

Procedure

Appointments were scheduled with the participants at times convenient to them. The participants were assessed in their work or school environment.

The participant was oriented to the simulation by a standardized demonstration, with a sample case, client number nine, being moved through the statuses. A list of the statuses and brief explanation of their purpose was provided. After the demonstration, the computer prompted the participant to enter demographic information, including their educational level, sex, age, occupational status (senior counselor, junior counselor, graduate student, undergraduate student), years of experience, and certification status.

A project researcher was available to answer questions throughout the simulation. Information given to the participants was limited to a repetition of information already presented in the demonstration.

Data Analysis

Initially, frequency counts and proportions of the sample of counselors and students taking the appropriate actions described above were tabulated. A multiple discriminant analysis (MDA) was then used to

determine the ability of the caseload simulation performance indicators (money spent on clients, total number of actions taken, total number of status changes, preferred action index, inappropriate status change index) to discriminate among TRC counselors and rehabilitation students. The direct method was used to enter all six performance indicators into the discriminant function. Because of a limited sample size, the minimum error rate (shrinkage) of the discriminant analysis classification results was estimated by the jackknife procedure (Lachenbauch & Mickey, 1968). The Biomedical P-Series statistical software (BMDP) (Dixon, 1981) and the Statistical Package for the Social Sciences (SPSSX) (Nie, 1983) were used to perform the computations.

Results

The frequency counts and proportions of necessary actions taken by the sample of students and counselors during the simulation are presented in Table 1.

Insert Table 1 About Here

The first four cases tend to differentiate the performance of counselors from students very

effectively. For example, in case one, it is important to review the general medical information available in the case file. For this action 72.2% of the counselors, as opposed to 22.2% of the students reviewed the medical, $X^2(1, N=36) = 7.13$, $p<.006$. The case one component of the PAI for counselors was a mean of 5.5 for the counselors, while the student's mean was 2.8, $t_a(34)=2.96$, $p<.006$.

On the second case, a general medical is required to establish eligibility. Of the counselor group, 88.9% took this action, compared to 16.7% of the students, $X^2(1, N=36) = 16.05$, $p<.006$. The case 2 component of the PAI differentiated between the two groups, with a counselor mean of 6.8 and a student mean of 4.6, $t(34) = 3.12$, $p<.004$. On case three, a general medical was necessary to determine eligibility. Seventeen (94.4%) of the counselors ordered this service, while only 44.4% of the students ordered it, $X^2(1, N=36) = 8.38$, $p< .004$. Based on the diagnostic information, this case should be closed in status 08. Twelve of the 18 counselors (66.7%) correctly closed this case, as opposed to 27.7% of the students $X^2(1, N=36) = 4.01$, $p<.05$. The case three component of the PAI was significantly different between the counselor and student participant groups,

$t(34)=3.12$, $p<.004$. Case 4 required movement of the client to status 26 after four simulation periods had passed in order to gain a successful closure. Here, 94.4% of the counselors correctly made this move, with only 61.1% of the students successfully closing the case. The case 4 component of the PAI differentiated between the two groups (counselor $M= 1.9$; student $M=1.4$; $p<.004$).

Cases 5 through 8 do not appear to differentiate counselors from students as effectively. This appears to be a result of the case composition, and starting points. Cases one through three begin in status 02, and require the participant to make all decisions related to the client's program. Little structure is provided by the simulation. In case four, the participant must realize that movement to status 26 is appropriate after a specific period of time, without cues from the simulation. In contrast, cases 5 and 8 begin in an action status. It is obvious to the participant that a service within that status should be provided. In cases 6 and 7, important cues for action are provided during the period activities log. On the simulation, it appears cases 1 through 4 require greater levels of caseload management skills.

One of the most important issues related to the

use of computer caseload simulations as an assessment device is the development of appropriate quantification procedures and the documentation of criterion validity of computer simulations as a measurement tool (Chan, Berven, & Lam, 1988). Based on this, a discriminant analysis was conducted using a linear combination of the performance measures to determine if the computer-based caseload simulation system successfully differentiated the performance of student participants from a counselor participant group. A statistically significant discriminant function was found to differentiate the two performance groups. Wilk's Lambda=.45, $X(6)=24.8$, $p < .001$. Three of the criterion measures: total number of status changes (.54), preferred action index (-1.03), inappropriate status change index (.53) contribute significantly to the discriminant function.

The indicators total money spent, total number of case actions, and appropriate closures were not significant. Money spent and total number of actions would be less likely to distinguish the groups, as a certain number of actions are required to make the simulation proceed. Both participant groups would be required to take similar amounts of actions, and thus spend similar amounts of money, in order to complete

the simulation. In addition, there was a limited amount of time in the simulation to obtain closures. It is likely if the length of the simulation was increased, the more successful performance of the counselors would result in a greater number of closures.

The group centroids for the two groups are -1.1 (students)and 1.1 (counselors) respectively. As can be observed, the discriminant function maximally differentiated the two groups. Thus, the existence of the hypothesized relation between subject performance and experience group membership is supported.

Finally, a classification function level was generated from the discriminant function derived. The classification function permits the input of an individual's score for each of the performance indicator to estimate the probability of membership in each of the training/experience groups. Overall, 89% of the participants were accurately classified. This is a considerable improvement over the base rate (chance) prediction of 50% (the sample sample size of the two groups is equal, n=18 and 18 respectively). Because of a limited sample, the minimum error rate (shrinkage) of the discriminant solution was estimated by the jackknife procedure proposed by Lachenbach and

Mickey (1968). The jackknifed classification indicated an overall classification accuracy of 80.6%. This shrinkage of only 8 % suggest the predictors used in the discriminant function are relatively accurate in discriminating the performance of the participants in this study.

Discussion

The results of the study indicate the computerized caseload management system developed can successfully differentiate between the performance of students and state vocational rehabilitation counselors on their caseload management skills. The variables of overall correct caseload moves, improper status changes, and total number of status changes were significantly different between the two groups, with the counselors performing with greater skill. Discriminant analysis yielded a function which discriminated between the students and counselors with high accuracy.

The results indicate computerized caseload management simulations have the potential to be useful and effective as a training tool in rehabilitation education. The simulation can be utilized as a practical experience accompanying a formal classroom experience in caseload management, much in the same

way clinical skills are practiced through counseling and university rehabilitation centers. The use of practical experience could be useful in helping the students retain the knowledge gained during education, which, as the results of the simulation indicate, is not being retained currently.

Informal discussion regarding the usefulness of the simulation with participants after completion indicated a majority of the participants felt the simulation could be helpful in education. Many students expressed the sentiment that they felt had never properly learned caseload management skills, and were very frustrated by the experience of participating. Many of the students indicated they felt the simulation would have been helpful in their learning caseload management. Several counselors felt there was potential value in the simulation, and felt that its use in their education may have helped them initially in caseload management.

Despite the success of the caseload simulation in distinguishing between the students and the counselors, it is still in a very early stage of development, with modification necessary prior to its inception as a training tool. Analysis of results, observations of participants using the simulation, and

discussion with the participants indicate the following modifications should be made in the simulation.

The simulation was designed to be completed in approximately an hour, due to time constraints of the participant groups. As a result, the simulation was restricted to 8 cases, and 10 periods. The periods required relatively few activities to expire, so the simulation would "move" quickly. This did enable the simulation to be completed quickly, but made the simulation less realistic. An increase in the number of cases developed would make the simulation more realistic, as it would be more similar to an actual caseload. It is not felt that the optimum number of cases for the simulation should be the same as an actual counselor's caseload. Without the cues available to an actual counselor (i.e. case files, meeting with the client), and the compressed time frame, a very large number of cases would be overwhelming. Therefore, 20 to 25 cases would likely be an optimum number for a simulation. An increase in the number of periods, and in the amount of time available in a given period would also enable the trainee to better handle the clients, and to take more cases to closure. A simulation of this type would

take a longer period of time to complete, and would probably be completed at more than one sitting.

A longer simulation of this type would require 3 to 5 cases designated as training cases, which would be used to orient the trainee to the simulation, and would not be recorded as part of the evaluation. The current simulation was designed to be as user friendly as possible, but as a result of the number of potential actions available, was still complex. During the first half of the simulation, participants asked many questions, and appeared to have difficulty performing the actions they desired. During the second half of the simulation, it appeared the participants were able to work more efficiently with the simulation. By designating five periods to be used for non-recorded orientation of the simulation, the discomfort with the computer system could be filtered, and a more accurate representation of performance obtained.

Another element which would make the simulation more realistic would be expansion of the options offered in each status. In the current simulation, in each status, the participant could only select options that were appropriate for the status. For example, if the participant realized that the case two client

required a hearing aid while in status two, and wished to order it, they were unable to do so, as the option was not present in status two. This was a cue to the participant to change statuses. Giving them the option to order any service in any status would be more realistic, and would likely to have more greatly differentiated between the student and counselor groups.

An important addition for the simulation to be most useful as a training tool would be addition of a feedback mechanism. Provision of a trainee with information on their performance would be necessary to assist a trainee to learn appropriate caseload management. This feedback could be provided at the end of the simulation, or at an assigned number of intervals throughout the simulation.

Caseload management simulations are truly in their infancy. There is a large amount of research to be done in this field. Further research of the current simulation with a larger group of subjects would be useful in validating the simulation. In addition, validation of a modified version of the simulation, with a larger number of cases, greater number of periods, slower period movement, and demonstration cases to see if these factors enhance

the differences between the student and counselor participant group would be important. An issue in conducting such a validation would be obtaining subjects to take the lengthy simulation. In conducting such a study, it would likely be necessary to provide a financial incentive for participation.

To further validate the caseload management simulation as a training tool, a study using a pre and post test of caseload management is proposed. A group of students could be given a written pre-test on caseload management. The student group could then be divided into the following three groups:

1. No caseload management training: these students would not participate in a class reviewing caseload management techniques.
2. Traditional training: these students would participate in a traditional introductory rehabilitation class in which caseload management is reviewed.
3. Training plus simulation: these students would participate in the introductory class, but in addition would utilize the simulation as a laboratory experience.

Following the training, the three student groups would be retested on caseload management. It would be

hypothesized the students participating in the simulation group would demonstrate the greatest difference between pre-test and post-test.

The simulation developed in this study appears to be a potentially effective tool in the education of students in rehabilitation. Modification and more research is required for the computerized caseload management simulation to reach its full potential.

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Table 1

Critical Actions Taken by The Rehabilitation Counselors and Students Sample for the Eight Cases

	Counselor n=18		Student n=18	
	%	n	%	n
Case 1				
General Medical	72.2	13	22.2	4
Psychological	77.8	14	55.6	10
Neurological	50.0	9	16.7	3
In Hospital Diagnostics	22.2	4	11.1	2
Psychotherapy	33.3	6	11.1	2
Primary diagnosis	16.7	3	0.0	0
Secondary diagnosis	66.7	12	44.4	8
Vocational Objective	44.4	8	38.9	7
Move to status 6	22.2	4	22.2	4
Move to status 10/12	77.8	14	66.7	12
Move to status 16	50.0	9	16.7	3
Move to status 22	5.5	1	0.0	0
Move to status 26	0.0	0	0.0	0
Case 2				
General Medical	88.9	16	16.7	3
Audiologist or Ear Nose and Throat	94.4	17	83.3	15
Medical Equipment	44.4	8	44.4	8
Check Finances	44.4	8	27.8	5
Primary diagnosis	94.4	17	77.8	14
Secondary diagnosis	88.9	16	72.2	13
Vocational objective	38.9	7	22.2	4
Move to Status 10/12	100.0	18	83.3	15
Move to Status 16	72.2	13	50.0	9
Move to Status 22	16.7	3	5.5	1
Move to Status 26	0.0	0	0.0	0
Case 3				
General Medical	94.4	17	44.4	8
Move to Status 08	66.7	12	27.7	5
Case 4				
Contact Client	94.4	17	77.8	14
Move to Status 26	94.4	17	61.1	11
Case 5				
Counsel Client	77.8	14	66.7	12
College Training	22.2	4	22.2	4
Move to Status 18	44.4	8	55.6	10
Move to Status 22	0.0	0	5.5	1
Move to Status 26	0.0	0	5.5	1

Table 1 (continued)

Case 6				
Move to Status 08	72.2	13	77.8	14
Case 7				
Move to Status 22	88.9	16	83.3	15
Move to Status 26	61.1	11	27.8	5
Case 8				
Trade/technical School	33.3	6	27.8	5
Move to Status 22	22.2	4	22.2	4
Move to Status 26	0.0	0	5.5	1

Appendix A

Instructions for Running the Computer Software

To Load The Caseload Simulation.

An IBM compatible computer is required, with a hard drive. Place the CR2DSK (B) disk in drive A, and copy it into the C: drive by typing "COPY A:*.rpt C:". This will take several moments. When this has been completed, place CRHARD disk into drive A, and type "CRHARD". This will begin the program.